


Memo

date: December 30, 2008

to: RSC

from: D. Beavis 

subject: Maximum Dose in an Hour at RHIC Chipmunk's

Introduction

A discussion of the chipmunks at RHIC occurred between E. Lessard, R. Karol, and myself on Dec. 26, 2008. It was decided that the discussion on removing the chipmunk interlocks at RHIC would be easier to compare to our present standards if it was presented in the context of mrem in an hour.

Dose in an Hour

The maximum dose in an hour is caused by a maximal beam fault. This occurs when 114 bunches of protons with 2×10^{11} per bunch strike an object in the ring at full energy (250 GeV).

Chipmunk (NMON)	Location	Max. Dose in an Hour (mrem)	Reference
232	1006B southeast corner		A Y-ARC Chipmunk
233	1005E-5GE1	72	1,2
234	1007W-6GE3	76	1,2
235	STAR Shield Wall	320	4
236	STAR 6ED1	155	1,2
251	1005S-4GE3 Labyrinth	13	1
252	1004A-4GE2	98	1,2
264	1002A-2GE2	209	1,2
267	1002C	475	5,6
280	1012A-12GE1	173	3
298	1010A-10GE1	78	1,3
312	1008A-8GE2	54	1,2
313	PHENIX Shield Door	399	7
314	PHENIX Counting House	333,110,20	8

References

1. S. Musolino, editor, "RHIC Safety Analysis Document", May 5, 1999. Appendix 16 has the documents for the Labyrinth calculations.
2. D. Beavis Memorandum, "[Labyrinth Calculations in RHIC SAD](#)", Dec. 16, 2008.
3. Recalculated by D. Beavis in a more conservative manner than reference 1. Main difference is how the second leg is treated. The new calculation treats the second leg with the Geobel first leg formula. This makes the attenuation a factor of 3 less than used in the RHIC notes.
4. A.J. Stevens memorandum, "Analysis of Cracks in the STAR Shield Wall", August 12, 1996 and "Estimate of Dose Through Cracks in the Star Shield Wall", RHIC/DET Note 23, August 1997. The total potential dose if the sum of the crack dose (50 mrem) and the shield wall penetrating the solid wall (267 mrem). These estimates were made before shielding was added to the tunnels as well as additional detectors.
5. [RSC Minutes, April 24, 1997](#). The number can be found in the attachment A. Stevens, "Calculations relevant to BRAHMS Shield Wall Design Status as of 4/23/97".
6. This chipmunk was removed during the Summer FY08 shutdown for the movement of building 1002C.
7. RSC Minutes of Sept. 10, 1996 and [Oct. 20, 1997](#).
8. A.J. Stevens memorandum, "Evaluation of the Current Counting House Shielding design at 8 O'clock", Sept. 17, 1996.

CC: RSC
A. Pendzick
A. Drees
RSC RHIC file